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ABSTRACT

The paper discusses literature which reports biological factors of criminal behavior and suggests how such biological characteristics might interact with the learning of moral behavior. The first three studies of predelinquent and prerecidivistic criminals measured autonomic nervous system responses to stress. Those who later became delinquent demonstrated somewhat underreactive nervous systems; that is, their pulse rates were lower than individuals undergoing the same stressful situation. The next three studies of families, twins, and adopted children linked genetic factors to antisocial behavior. Studies of antisocial individuals also indicated that presence of hyporeactive nervous systems. The conclusion is that adequate physiological fear is essential to the learning process. For example, fear of punishment leads a child to inhibit his stealing impulse; the person with an underreactive nervous system has a slower response to fear-inducing situations. Implications for these findings involve the predictability of who may later become a serious criminal and the possibility of preventive intervention. However, models of intervention such as behavior-altering drugs and severe punishment are inappropriate. (Author/KC)

Human Nature, Crime and Society [1]

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Many months ago President Carter visited The Bronx to help him better understand the need for urban renewal. His attention was drawn in particular to Charlotte Street which the New York Times had called the worst slum street in New York City. The President duly proclaimed the Charlotte Street Project; it would be a model for national urban renewal programs.

I drove up to The Bronx recently and was rather shocked. The district is almost entirely leveled; buildings which are still half-standing are windowless. The Charlotte Street Project is apparently forgotten.

The experience gave me a sinking, frightened feeling. I spent my childhood and adolescence on Charlotte Street. It was not a rose garden then; but it is still uncomfortable to look for your childhood home and find rubble.

Why did this area disintegrate as so many other areas are disintegrating? Economists and politicians will doubtless propose learned and well developed reasons. But I can tell you why my family and friends thought they left. A neighborhood boy my age was stabbed to death in front of our apartment house by some cruising youths. Our good friend, the grocer, was held up and shot in the shoulder. Older people hardly dared venture out of their heavily locked doors. It was danger that drove them from their homes. And the situation does not seem to be rapidly improving. In 1978, violent crime increased 5% (Los Angeles Times, March 28, 1979). Most disheartening is the focus of this increase in youngsters; more crimes are now being committed by children under 15 than adults over 25. In the past 20 years juvenile crime has increased 1600% (Godwin, 1978). Judging from past experience, these youngsters are not going to be rehabilitated overnight. I don't like to "view with alarm" but, many of them are walking time bombs with long criminal careers ahead of them.

The response has been to devise more and more imaginative methods to construct prisons and institute rehabilitation programs. In other words, society's agents have acted in response to criminal behavior after it is evidenced.

I don't know anyone who believes that our methods of dealing with crime have been a blazing success. Perhaps we need to stop and rethink our situation. First, do we want to reduce crime?--If so, how! Currently our major efforts to control crime start with individuals already delinquent or criminal. We spend fortunes on developing mace, nicer jails, methods of rehabilitation and faster court systems. Less effort is expended on the primary prevention of crime. I wish to suggest that along with efforts to deal with discovered criminality, we study methods of early intervention to prevent the initial onset of criminal behavior.

Primary prevention. I can imagine three avenues in which primary intervention might be explored:

1. Ecological alterations
2. Systematic societal change.
3. Individual intervention.

1. Ecological alteration. By ecological alteration I refer to environmental manipulation such as increasing street lighting--improving supermarket and department store security, and defensive architectural design. I will not consider this method further in this paper.

2. Societal change. In this century criminology has been dominated by sociological thinking. And for good reason. It seems quite clear that socioeconomic factors provide the reasons for crime for most criminals. Sociological thinking has suggested that the etiology of crime lies exclusively in the structure of society. It is expressly assumed that criminals are normal individuals who have been misshapen by an inappropriately arranged social system. If we improve this system, this should prevent criminality.

A critical assumption of this approach to primary prevention is the essential normality of criminals. To the extent that some criminals have deviant psychological or biological characteristics which help predispose them to antisocial behavior--then societal manipulation alone will not be sufficient to prevent crime. (I am, in principal, opposed to arguing for societal adjustment for the betterment of the human condition solely on the promise of reducing crime or mental illness. Human conditions should be improved because we are human. Unrealized promises simply promote reactionary backlash.) Thus, in order to better plan the primary prevention of criminal behavior we must first consider evidence regarding the possibility that some forms of criminal behavior have individual psychological or biological predispositions.

3. Individual intervention. This bio-individual approach to understanding the criminal has been less than popular in the social sciences. Let us take a moment and consider the reasons for this. In the beginning there was no significant conflict. Auguste Comte in 1855 acknowledged that "The whole social evolution of the race must proceed in entire accordance with biological laws..." Perhaps the problems began 23 years later when Herbert Spencer applied

his phrase--"survival of the fittest" to social behavior. His prostitution of the theory of evolution for the preservation of class privilege was an outrage to social reformers. Spencer (1878) literally urged the "shouldering aside of the weak by the strong..." Social Darwinism inevitably led to racism. Expedient ethics had their day again in the 1920's in the U.S. in the exploitation of spurious intelligence test results to rationalize discriminatory immigration laws. Nazi ideology did not improve the attractiveness of biosocial interactionism. In the 30's, 40's and 50's social science academia simply excluded the consideration of biology from the same context as social factors.

Haller (1968) has suggested that part of the reason for this was that many of those who had been pointed to as inferior by our immigration laws had struggled to the top of the social economic status heap (including the academic heap). Politically and emotionally these individuals turned away from biology. But perhaps even more telling than these emotional factors was a simple intellectual reason: there was very little compelling, empirical, biological evidence which could help us understand social man or (more specifically) criminality. The evidence for genetic influences on criminality, consisted mainly of some relatively inadequate and ignored twin studies (some of which were tainted by having originated in Germany of Japan during the Nazi era). In addition the literature offered some entertaining, well written and inventive analogies to observations of animal behavior. Social scientists found biological factors to be not only affectively repulsive but coincidentally not intellectually compelling.

Within the last 5-10 years, however, there have been research developments which are not totally unworthy of the attention of the criminologist.

These research developments may have implications for the planning of primary prevention programs. Consequently I will briefly reveiw evidence relating biological factors to crime. I will first focus on three prospective, longitudinal studies.

Three Prospective Studies of Antisocial Behavior

The first study concerns the delinquents in a "sample of 5362 single-born, legitimate, live births in 1946 occurring between March 3 and 9 in England, Wales and Scotland" (Wadsworth, 1976). Wadsworth described the cumulative, officially recorded delinquency when this birth cohort reached 21 years of age (Wadsworth, 1975). He then went on to examine the relationship of this delinquency to a childhood measure of autonomic nervous system responses to anticipation of stress. The survey members were subjected to a school medical examination when they were 11 years of age. The period of time during which they waited for this examination was designed to be somewhat stressful. Their pulse rate was measured to assess the effects of this stress anticipation. Those who were eventually registered as delinquents at 21 years of age had a lower pulse rate increase in anticipation of the stress at age 11. Delinquents in this study were defined as those who "either made a court appearance or were formally cautioned by the police between the ages of 8 and 21 years". (pg. 249) The delinquent-not-delinquent differences were substantial for those committing indictable and sexual and violent offenses.

The Wadsworth study also makes an important point relating to the interaction of biological and social factors. Within the group of boys who had experienced broken homes early in life, anticipatory pulse rate did not distinguish the delinquents. Within the boys who did not experience broken homes, a small anticipatory pulse rate did predict well to delinquency. This type of interaction of biological (pulse rate)

and social (family disruption) data is predicted by Christiansen (1977) and Sellin (1938), and has been observed repeatedly in our research in Copenhagen. The biological factors predict best in those areas, situations, or among those groups in which social factors (e.g., stable home, middle class status) do not "explain" antisocial behavior. In those situations, areas, or groups in which the social variables (broken home, or lower class status) do predict to antisocial behavior, the biological variables are less effective in prediction.

The Wadsworth study is important because it is based on a large, national birth cohort. The results must be seen as representative. We should also remember that the data on pulse rate were gathered by hundreds of different physicians in different schools using rather primitive methods. Not all of these measurements were equally accurately taken. About 10 years intervened between the recording of the pulse rate and the ascertainment of delinquency. Despite these conditions, which in most research do not tend to inflate positive findings, the hypothesized results emerged. Those who did not suffer anticipatory "fear" before the examination were those boys who later were more likely to become seriously delinquent. Perhaps this anticipatory fear was also lacking before they committed the act (or acts) which gained them access to the delinquent group.

It may be worth underlining one other feature of the Wadsworth study. The low anticipatory pulse rate was observed 10 years before the delinquency was assessed. It is unlikely that the delinquency experience produced the low pulse rate. The prospective nature of the study establishes low pulse rate in anticipation of a stress as a variable worthy of consideration among the potential etiological factors in delinquency.

How salient a predictive factor is pulse rate? Not very. In the Wadsworth study it predicts to delinquency about as well as the variable, "broken home". It is naive to expect that any variable alone (biological or social) will explain large amounts of delinquency variance. Delinquency is likely to be as complex in its causation as it is in its manifestations. Note, however, that when the interactive effect of pulse rate and family factors is assessed, prediction improves considerably.

A second prospective study. Janice Loeb and I (1977) have reported on a 10-year follow-up of a group of Danish adolescents. In 1962 we examined their skin conductance (a peripheral autonomic measure); in 1972 we ascertained their registered delinquency from the Danish National Police Register. At 10-year follow-up, seven boys of the 104 adolescents were noted as having been registered for mildly delinquent acts. The pre-delinquency 1962 skin conductance level, responsiveness and recovery of the seven delinquents was below that of the controls. The mean amplitude of response of the delinquents was one-tenth that of the non-delinquents.

The third prospective study I will cite was conducted by Hare, (1978). In 1964, he examined skin conductance in a group of serious, convicted criminals [redacted] in a maximum security prison. Ten years later he checked to see how seriously recidivistic the prisoners subsequently became. Skin conductance recovery in 1964 predicted to degree of recidivism 10 years later.

I would make several points relating to these prospective studies.

1. In combination with social and familial factors such biological characteristics which presage the later development of delinquency might be useful in early detection. The development of such early detection techniques would be an important first step in a program of primary prevention.

2. Studies in Philadelphia by Wolfgang, Figlio and Sellin (1972), research in Stockholm by Gösta Carlsson (1977), West and Farrington (1973) in the inner city of London and our own research on a birth cohort of 32,000 men in Copenhagen has rather reliably indicated that only a very small subgroup of the antisocial individuals are responsible for most of the criminal acts and the more serious criminal acts. The bio-social familial prediction measures seem to be most appropriate to pre-identifying this small group of most serious criminals. A program of intervention focussed on such a small number of individuals might prove disproportionately effective in crime reduction.

3. All three of the prospective studies are consistent with a description of the predelinquent and prerecidivistic criminal having somewhat underreactive autonomic nervous systems.

Genetic and Psychophysiological Factors and Antisocial Behavior

I will next discuss evidence that such underreactive autonomic nervous systems are characteristic of criminals. I will also consider the possible origins of this state, including genetic factors. Let us examine the evidence that genetic factors are related to the etiology of antisocial behavior. What is the point of examining the genetics literature? One one of importance from my point of view. If it can be demonstrated that there is some genetic contribution to some forms of criminality then consideration of a partial biological predisposition for antisocial behavior would be forced upon us. This would have implications for directions of research. There are three genetic research strategies we will briefly describe - family studies, twin research and adoption investigations.

Family studies. It has long been observed that antisocial parents raise an excessive number of children who also become antisocial. In the

classic study by Lee Robins (1966) one of the best predictors of antisocial behavior in a child was father's criminality. In terms of genetics very little can be concluded from such family data inasmuch as it is difficult to disentangle hereditary and environmental influences.

Twin studies. Twin studies compare criminal outcomes for identical and fraternal twins. The influence of hereditary factors is assumed to be demonstrated to the extent the identical twins have more similar outcomes than fraternal twins. From 1929 - 1977 I have found 10 twin studies in the literature. The early studies report about 60-70% concordance for crime for identical twins and about 15% concordance for fraternal twins (Christiansen, 1977a).

The most important study of these 10 was conducted by K.O. Christiansen who investigated the fates of all 7,172 twins born in a well defined area of Denmark. He used a national, complete criminality register about which Marvin Wolfgang (1977) has said, "the reliability and validity of the Danish record keeping system are almost beyond criticism. The criminal registry office in Denmark is probably the most thorough, comprehensive and accurate in the Western world". Christiansen notes that "There are several important characteristics of the Danish law enforcement process that relate to its statutory uniformity regarding treatment of the offender and sentencing by the court. Police officers are legally required to report cases if they have a suspect. They are not permitted to make judgements in such matters... The social status of a Danish police officer is comparatively high; they are regarded as being incorruptible". (p. 93)

In this, the largest and best designed of the twin studies of criminality, Christiansen (1977b) reports 35% concordance for MZ (male-male) pairs and 13% concordance for the DZ (male-male) pairs. (Percents given are

pair-wise concordance rates.) In this unselected twin population the MZ concordance rate is lower than in previous studies. In fact it is important to note that more cases are discordant than concordant. This suggests that genetic factors control a minor but significant portion of the variance. Nevertheless, the MZ rate is 2.7 times the DZ rate. This result suggests the possibility that there is some genetically-controlled biological characteristic (or set of characteristics) which is identical for the MZ twins and which in some unknown way increases their common risk for being registered for criminal behavior.

The results of the twin studies do not contradict the hypothesis that some genetically transmitted, biological characteristic predisposes to anti-social behavior.

Adoption studies. The problem with twin studies is that the twins are almost always raised together. There is poor spearation of genetic and environmental factors. The adoption design does a better job of this separation. Children adopted at birth share no environment with their biological fathers. If criminality in the biological fathers is related to criminality in their adopted-away children then this suggests that the criminal biological fathers have genetically transmitted some criminogenic, biological characteristic to their children.

Crowe (1975) studied a small group of adopted children born to women in prison as well as control adoptees. The adopted children with criminal biological mothers were registered for more crimes than were adopted children with non-criminal biological mothers. Cadoret, (1978) reports that among 246 Iowans adopted at birth, criminality in adoptees and their

biological parents was significantly related. (He ascertained criminality by telephone interview of the adoptive parents.)

In Copenhagen, Schulsinger (1977) finds excessive amounts of psychopathy among the biological relatives of psychopaths who had been adopted at birth. In this study Schulsinger identified psychopaths from a population of all the 5,483 Copenhagen County adoptions 1924-1947.

From these same 5,483 adoptions Hutchings & Mednick (1977) ascertained the registered criminality of the male adoptees, their biological fathers and their adoptive fathers. The results are given in Table 1.

Insert Table 1 about here

As can be seen in the upper left-hand cell, if neither the biological nor the adoptive father is criminal 10.5% of their sons are criminal. If the biological fathers is not criminal but the adoptive father is criminal this figure rises to only 11.5%. In the upper right-hand corner of Table 1 note that 22% of the sons are criminal if the adoptive father is not criminal and the biological father is criminal. Thus the comparison (analogous to a cross-fostering comparison) seems to favor a partial genetic-etiology assumption. We must caution, however, that the adoption methodology has a number of drawbacks. These have been discussed by Mednick & Hutchings (1977). In an extension of this study we have now constructed analogous tables for 7,000 adoptees and 28,000 biological and adoptive relatives; the results replicate. We will soon be reporting results for all 14,435 adoptions in our study. These 14,435 adoptions comprise all the adoptions in the Kingdom of Denmark between 1924 and 1947.

It seems that a partial genetic predisposition for antisocial behavior must be considered a serious possibility. I would again emphasize that the expression of the genetic predisposition depends very heavily on social

factors. Thus, in middle and upper classes the genetic effect is more strongly expressed. In the lower clases the genetic effect is more weakly expressed. As mentioned above, this is in excellent agreement with Thorstin Sellin's group resistance theory (1938). In social settings which are highly resistant to crime, individuals who become criminal must have strong individual predispositions. Finally I would say the obvious--this genetic predisposition must be biological.

The three prospective studies have directed our attention to autonomic nervous system "underreactiveness" as possible being predispositional to antisocial behavior. Twin studies in our Copenhagen laboratories have suggested that important components of the autonomic response system are heritable (Bell, Mednick, Gottesman & Sergeant, 1977).

Autonomic nervous system of antisocial individuals. I will now summarize literature which examines the autonomic responsiveness (specifically the skin conductance response) of antisocial individuals. Much of the research began with consideration of psychopaths. Clinical descriptions of the psychopath include phrases such as lacks emotion, callous, fee no guilt, no shame, no remorse, incapable of love, fails to learn from punishing experiences, cannot emotionally anticipate consequences. Studies of physiological indicators of emotion have noted that these clinical descriptions fit the objective measurements of the physiology of the psychopath. Interestingly enough the physiological descriptions also fit criminals, delinquents and (as we have seen) predelinquents. (See Mednick & Volavka, in press for a review of this work.)

For example, in one type of study, physiological measures of autonomic nervous system functioning are continuously monitored. The subject is told that at the count of 9 he will experience a severe electric shock. The

more psychopathic, delinquent or criminal individual does not evidence anticipatory heart rate, skin conductance or biochemical indicants of fear. This is even true of psychopathic Swedes studied just before they walked into the courtroom for their criminal trial (Lidberg, Levander, Schalling, & Lidberg, 1978).

The results in this area of research are remarkably consistent and robust across a variety of experimental procedures, definitions of antisocial, and different national settings. The antisocial groups consistently demonstrate hyporeactive autonomic nervous systems. Recall the three prospective studies which find that these same psychophysiological characteristics predict to antisocial behavior ascertained 10 years hence. In view of our twin study results, (Bell, Mednick, Gottesman & Sergeant, 1977) it is tempting to hypothesize that these physiological characteristics may be a part of the biological predisposition passed on from an antisocial parent. Indeed in our laboratory in Copenhagen we have found that a group of children with fathers registered for criminality tends to have the very same physiological signs which have been found to be reliably characteristic of the delinquent, psychopath and criminal (Mednick, 1977).

Biosocial Interactions in the Learning of Morality

Much of this paper has been devoted to reporting literature which finds some biological factors in criminal behavior. Perhaps it would be useful to close with a specific suggestion as to how such biological characteristics might interact with family and social factors in interfere with the learning of moral behavior. It would do no great harm to begin with a discussion of how we define morality. An early publication may be found in Table 2.

Insert Table 2 about here

Note that the major thrust of the message is negative, "thou shalt not..." While subsequent moral authorities have added some positive acts to elaborate the definition of moral behavior (e.g., "Love thy neighbor"), they have also retained the original, basic, inhibitory definitions of moral acts. Thre are very few who will denounce you if you do not love your neighbor; but if you seduce his wife, steal from him/and or kill him you may be certain that your behavior will be classified as immoral. Thus, putting aside philosophical, poetic or artistic musing on morality, we might admit to ourselves that the statements of moral behavior which are critical for everyday activities are essentially negative and inhibitory in character. The fact that someone took the trouble to enumerate these strictures and then carve them onto stone tablets, suggests that at some point, there must have been a strong need for insistence on these inhibitions. People must have evidenced and prehaps still do evidence a tendency to exhibit aggressive, adulterous and avaricious behavior. In self-defense, society has set up moral codes and has struggled to teach its children to inhibit impulses leading to transgression of those codes.

How are these inhibitions taught to children? As far as I can see there are three learning mechanisms which could conceivably help parents teach children civilized behavior: modelling, positive reinforcement, and negative reinforcement. I believe that positive acts such as loving neighbors, helping old ladies across the street, and cleaning the snow and ice from the front walk can be learned by modelling; but for the more inhibitory moral commands, modelling does not seem to be a natural method. It is possible to imagine arranging circumstances in some artificial way, such that modelling could teach children not to be adulterous,

or aggressive. If our civilization had to depend solely on modelling, however, it is conceivable that things might be even more chaotic than they are today. It is also possible to use positive reinforcement to teach inhibition of forbidden behavior; but again reinforcing a child 24 hours a day while he is not stealing seems a rather inefficient method and not very specific.

Following the excellent exposition of Gordon Trasler (1972), we would suggest that childhood learning of the avoidance of transgression (i.e., the practice of lawabiding behavior) demanded by the moral commandments is probably, in the main trained via contingent negative reinforcement (punishment) applied by society, family and peers. The critical inhibitory, morality-training forces in childhood very likely are 1) the punishment of antisocial responses by family, society and friends, and 2) the child's individual capacity to learn to inhibit antisocial responses.

Let us attempt to be specific and to relate how children might learn to inhibit an impulse to steal. Frequently when a child steals from his parents, his peers, siblings or a 5 & 10¢ store he is punished. After a sufficient quantity or quality of punishment, just the thought of the act of stealing should be enough to produce a bit of anticipatory fear in the child. If this fear response is large enough, the extended fingers will relax and the stealing impulse will be successfully inhibited.

Our story suggest that what happens in this child after he has successfully inhibited such an antisocial response is critical for his learning of civilized behavior. Let us consider the situation again in more detail.

1. Child contemplates stealing.
2. Because of previous punishment he suffers fear.
3. Because of fear he inhibits the stealing impulse.

WHAT HAPPENS TO HIS ANTICIPATORY FEAR?

4. Since he no longer entertains the stealing impulse, the fear will begin to dissipate, to be reduced.

We know that fear-reduction is the most powerful, naturally-occurring reinforcement which psychologists have discovered. So the reduction of fear (which immediately follows the inhibition of the stealing) can act as a reinforcement for this inhibition and will result in the learning of the inhibition of stealing. The powerful reinforcement associated with fear reduction increases the probability that the inhibition of the stealing will occur in the future. After many such experiences, the normal child will learn to inhibit stealing impulses. Each time such an impulse arises and is successfully inhibited, the inhibition will be strengthened by reinforcement since the fear elicited by the impulse will be reduced following successful inhibition.

What does a child need in order to learn effectively to be civilized (in the context of this approach)?

1. A social censuring agent (typically family or peers) AND
2. An adequate physiological fear response AND
3. The ability to learn the fear response in anticipation of an antisocial act AND
4. Fast dissipation of physiological fear to quickly reinforce the inhibitory response.

I have indicated earlier that there is consistent evidence that the antisocial indvidual does not have an adequate fear response and does not learn adequately to emotionally anticiapte negative events. The evidence regarding the final point--rate of dissipation of fear is unequivocal--the antiosical individual tends to evidence very slow fear dissipation (Mednick & Volavka, in press). In terms of this theoretical approach, this suggests that under normal rearing conditions he is not adequately rewarded for inhibiting antisocial responses.

Concluding Remarks

In these brief remarks I have attempted to describe recent evidence that biological factors may play some partial role in the origins of antisocial behavior (or perhaps some forms of antisocial behaivor). The biological factors can aid in understanding the conditions leading to antisocial behavior in situations or populations where social-familial factors are less successful at prediction. These include, for example, middle or upper class background; recidivistic criminality, female criminality or crime in rural areas. It is in these situations or individuals that the biological variables show stronger relations with antisocial behavior. In circumstances or individuals where social-familial factors would predict elevated crime, (such as lower social class rearing) the biological factors are less effective in prediction.

What the implications of these recent findings may be is far from clear at this point. Certainly no social action would be advised without considerable additonal research efforts and replication. Perhaps these findings suggest that we reevaluate our ability to predict early who might later become a serious criminal. The complementarity of the social-familial

and biological variables suggests that adding the biological variables to the highly effective social-familial factors (Robins & Ratcliff, in press) in a single predictive study might eventually yield acceptably accurate prediction of serious recidivism.

If excellent prediction were possible what preventive intervention might shield children or adolescents from a crime career? Perhaps the variables which predict to future serious crime will suggest intervention strategies. Acting on the above reported reliable findings of low autonomic nervous system arousal in antisocial individuals, Dinitz

have begun some pilot research attempting to alter this low arousal state by drug administrations to bring delinquents up to normal arousal states. They report some success with this method, working with an extremely small group of delinquents. An important problem in such drug intervention may be to guard against long term unwanted side effects. It is the danger of such side effects which moved us to reject drug intervention in a primary prevention project in the field of serious mental illness (schizophrenia). We chose the conservative step of an excellent, protective nursery school program (Mednick, 1979).

In this Academy meeting Professor David Bakan has raised the possibility of using severe punishment (his expression was "to terrorize") individuals who were identified as possible future criminals. This would certainly seem to be in inappropriate model for intervention. While mild punishment is probably the prevailing method families, peers and society uses to teach small children to inhibit antisocial conduct, it would not seem likely or promising technique for pragmatic intervention

I would record one final thought in this paper. As pointed out above, social scientists have had strong negative emotional reactions to attempts to understand the role biological factors play in the development of social man. These negative emotional reactions have often been responsive to biological sceintists' drawing irresponsible or premature conclusions from fallible correlational research. Such scientific carelessness is especially reprehensible in circumstances where political forces may attempt to use such permature conclusions in justifying repressive social action. Responsible criticism of faulty methods or unfortunate, inadequately grounded conclusions is a necessary and important part of a scientist's work. But I would emphasize the word "responsible". Remember that earlier attempts to silence or retard scientific inquiry by public appeals to emotion or public burning of books has not proven as successful as a single intelligent penetrating methodological analysis.

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Table 1

Registered Criminality in Adoptees and their Fathers

"Cross-fostering" Analysis

(Tabled values are precentage of adoptees criminal)

		If Biological Father is		
		Not Registered	Minor Crime	Criminal
If adoptive father is	Not Registered	10.5	16.5	22.0
	Minor Crime	13.3	10.0	10.0
	Criminal	11.5	41.1	36.2

Table 3

THE TEN COMMANDMENTS
-Exodus

I AM THE LORD THY GOD, THOU SHALT HAVE NO OTHER GODS BEFORE ME.

THOU SHALT NOT MAKE A GRAVEN IMAGE NOR BOW DOWN OR SERVE THEM.

THOU SHALT NOT TAKE THE NAME OF THE LORD YOUR GOD IN VAIN.

REMEMBER THE SABBATH DAY AND KEEP IT HOLY.

HONOUR THY FATHER AND THY MOTHER.

THOU SHAL NOT KILL.

THOU SHALT NOT COMMIT ADULTERY.

THOU SHALT NOT STEAL.

THOU SHALT NOT BEAR FALSE WITNESS AGAINST YOUR NEIGHBOR.

THOU SHALT NOT COVET THY NEIGHBOR"S HOME, WIFE, MAIDSERVANT, OX, ASS.